PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Compressed Air Brake Installation for Vehicles Equipped with Pneumatic Suspension

We, KNORR-BREMSE G.M.B.H., a German Company, of 80, Moosacherstrasse, Munich, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a compressed air brake installation for vehicles equipped with pneumatic suspension, in which the brake is dependent on the pressure obtaining in the pneumatic suspension.

With such compressed air brake installations, it is known for the air pressure obtaining in a pneumatic suspension bellows of a vehicle axle in dependence on the load to be utilised for controlling the admission to the brake cylinder when braking. Presupposing an even loading of a vehicle, there is produced in this case a load-dependent operation of the brake which is adequate for practical requirements.

With uneven loading of a vehicle, however, such as is often produced during the loading, but also occurs because of a shifting of the load during the journey or when travelling through a curve, the air suspension bellows distributed on the axles of a vehicle are differently loaded and therefore show a differential air pressure. The known load-dependent brake devices tap-off the pressure prevailing in only one of these suspension bellows and supervise the braking operations in accordance with this pressure. With the uneven loading referred to above, this results in underbraking or overbraking of the vehicle.

It is an object of the invention to obviate these disadvantages.

According to the present invention there is provided a compressed air brake installation for vehicles equipped with pneumatic suspension, in which the braking is arranged to be dependent on the pressure obtaining in the pneumatic suspension, characterised by means which form a mean of the pressures obtaining in two compressed air springs one on each end portion of a vehicle axle, such mean pressure serving as a load-dependent control pressure which is arranged to vary the braking pressure.

For a better understanding of the invention and the method of carrying the same into effect reference will now be made to the accompanying drawing, in which:—

Figure 1 is a diagrammatic elevation of a load-dependent braking system applied to an axle of a trailer of a tractor-trailer road vehicle, and

Figure 2 is a diagrammatic illustration of an alternative form of control means for the braking system of Figure 1.

According to Figure 1, the vehicle body 1 is supported at opposite sides by air suspension bellows 3 and 5 mounted on the vehicle axle 7, which carries vehicle wheels 9, 11 at its ends. A trailer brake pipe 13 leads from a motor vehicle (not shown) to a trailer control valve 15, which comprises a load-dependent device adjustable by a lever 17. The trailer control valve 15 is connected by a pipe 19 to a brake cylinder 21 and by another pipe 23 to a braking air reservoir 25, and through an overflow valve 27 to another compressed air reservoir 29. From the compressed air reservoir 29, a pipe 31 leads to two air suspension valves 33, 35 which are fixed on the vehicle body and which are associated with the bellows 3 and 5, respectively; these valves 33, 35 control admission of compressed air to the bellows, by means of detector rods 37, 39 mounted on the vehicle axle 7 and levers 41, 43, depending on the spacing between the vehicle body 1 and the vehicle axle 7. The pressures obtaining in the air suspension bellows 3, 5 act by

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way of the pipes 45 and 47, respectively, on pistons 48 and 50 respectively. The pistons 48, 50 form part of a control device and are connected together in tandem by a rod 49. The pistons 48, 50 are loaded by a spring 51 and preferably have an effective area ratio of 1 : 1. A piston rod 53 transmits the movements of the pistons 48, 50 to the lever 17 of the trailer control valve 15.

With the brake released, compressed air flows from the trailer pipe 13 and by way of the trailer control valve 15 and the pipe line 23 into the braking air reservoir 25. When this is charged up to a certain pressure, the compressed air flows still further through the overflow valve 27 into the air reservoir 29 and through the pipe 31 to the air suspension valves 33, 35, which set a higher or lower pressure in the air suspension bellows 3, 5, depending on the loading of the vehicle body 1, so that the latter is always at the same height above the vehicle axle 7. The load-dependent pressures obtaining in the air suspension bellows 3, 5 act on the associated pistons 48, 50 which are thereby displaced to the left and compress the spring 51 to a condition of equilibrium, so that the trailer control valve 15 is adjusted according to the mean axle loading, through the piston rod 53 and the lever 17.

On braking, the trailer control valve 15 separates the trailer brake pipe 13 from the braking air reservoir 25 and controls the introduction of air from the braking air reservoir 25 into the brake cylinder 21, depending on the fall in pressure in the pipe 13 and the position of the lever 17.

An arrangement other than the joined pistons 48, 50 can be used for controlling the trailer brake valve 15 according to the vehicle load. One such other arrangement is shown by way of example in Figure 2, in which are shown two cylinders 61, 63 arranged in parallel relationship, the pistons 65, 67 thereof being acted upon on one side by a spring 69 or 71 and on the other side through the pipes 45 or 47 by one of the air suspension bellows 3, 5. The two piston rods 73 and 75 are articulated to the ends of a balance beam 77, the centre of which is engaged by the lever 17 of the trailer control valve 15. With this arrangement, it is also possible with equal piston area of the pistons 65, 67 and equal springs 69, 71 to achieve the effect that the lever 17 is at any time adjusted according to an average axle loading.

The arrangement of the invention can of course also be used with vehicles which have a suitable braking installation different from that shown in Figure 1, such as for example a two-pipe compressed air brake.

It is also possible within the scope of the invention to use such a design of the control valve 15 that the cylinders associated with the pistons 48, 50 or 65, 67, by being flanged onto the control valve 15, are combined to form a unit with the latter, and the piston rod 53 or the balance beam 77 acts directly on that valve device of the control valve which is to be adjusted and usually is constructed as a sliding block.

WHAT WE CLAIM IS:—

1. Compressed air brake installation for vehicles equipped with pneumatic suspension, in which the braking is arranged to be dependent on the pressure obtaining in the pneumatic suspension, characterised by means which form a mean of the pressures obtaining in two compressed air springs one on each end portion of a vehicle axle, such mean pressure serving as a load-dependent control pressure which is arranged to vary the braking pressure.

2. Compressed air brake installation as claimed in claim 1, wherein the pressures obtaining in the air springs are arranged to act one on each of two tandem connected pistons which are spring-loaded, the tandem connected pistons being arranged for varying the braking pressure.

3. Compressed air brake installation as claimed in claim 2, wherein the effective area ratio of the two pistons is 1 : 1.

4. Compressed air brake installation as claimed in claim 1, wherein the pressures obtaining in the air springs are arranged to act one on each of two spring-loaded pistons, the movements of which are applied to opposite ends of a balance beam which is arranged to control the braking pressure.

5. Compressed air brake installation as claimed in claim 4, wherein the pistons are of equal effective area.

6. Compressed air brake installation substantially as hereinbefore described with reference to Figure 1 or Figure 1 with the modification of Figure 2 of the accompanying drawing.

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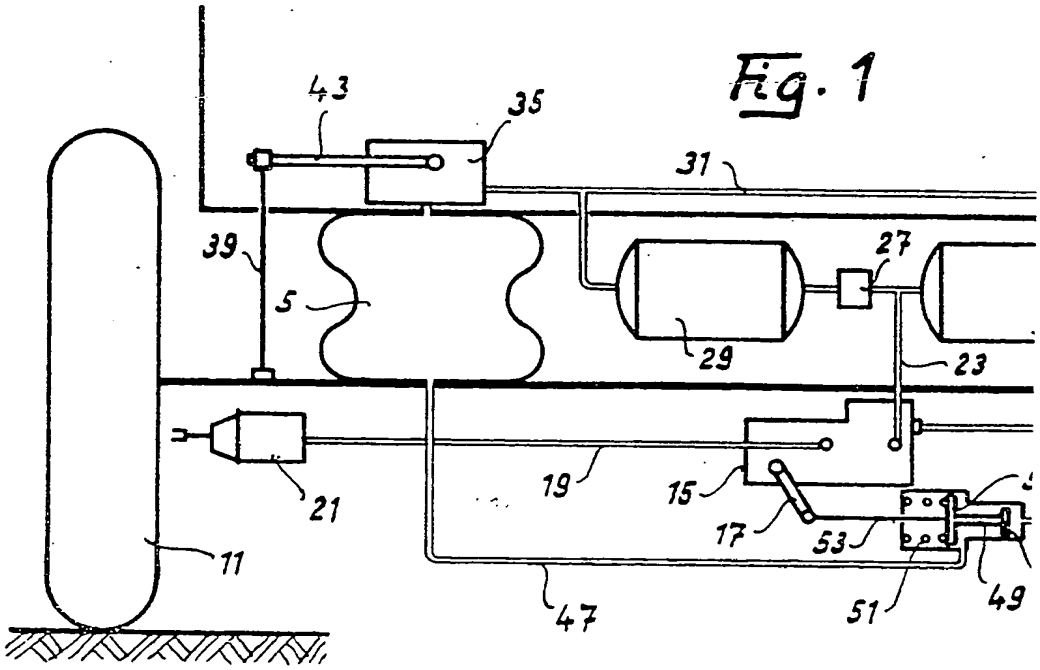

Fig. 1

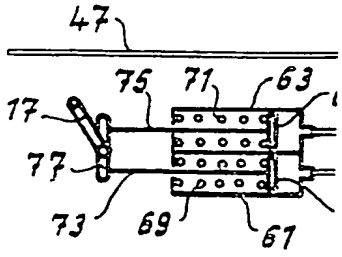

Fig. 2

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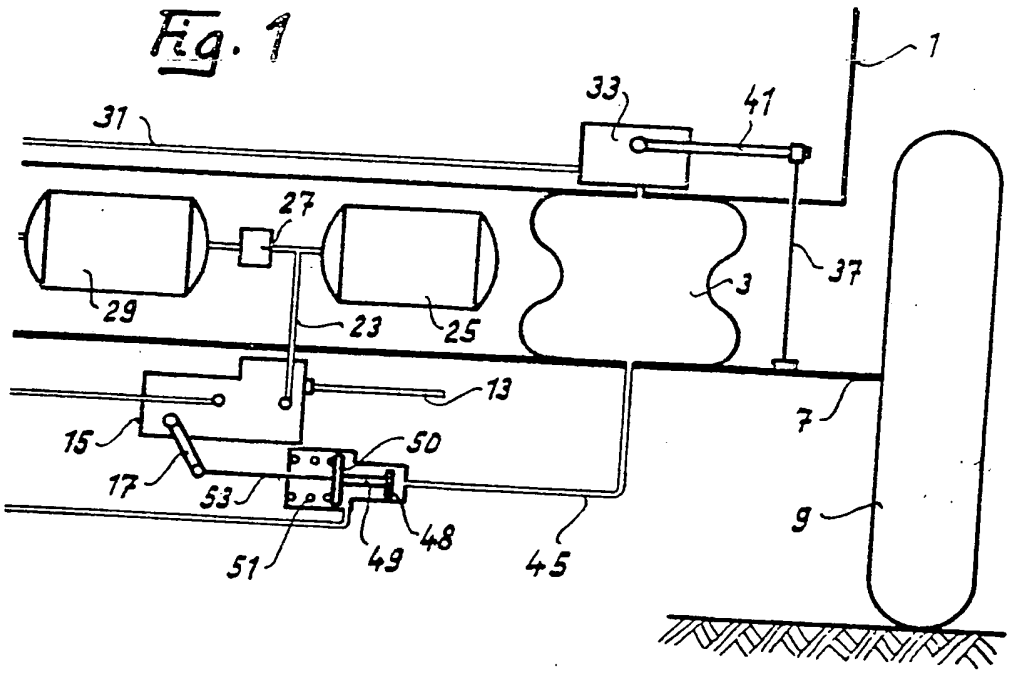
Fig. 1



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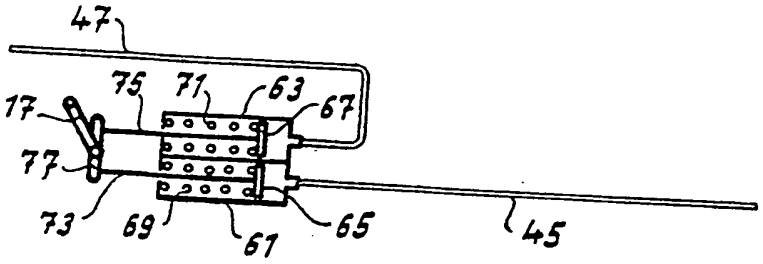

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